

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-149325

(43)Date of publication of application : 06.06.1997

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(51)Int.Cl. H04N 5/44

H04N 5/00

H04N 5/445

H04N 5/92

H04N 5/93

H04Q 9/00

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(54) GRAPHIC DISPLAY DATA DISTRIBUTION-TYPE AV SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To attain graphic displaying peculiar to respective AV equipments by permitting the respective AV equipments to keep peculiar graphic display data and transmitting it to the AV equipment with a graphic display function as necessary.

SOLUTION: CPU 1 controls the graphic display of a whole AV system by executing a graphic display program for driving GUI. A data bus 2 generates a data path for inputting/outputting in CPU 1. VRAM 3 is a memory for storing a graphic image

equivalent to one screen. PROM 4 stores icon data, etc., transmitted from the respective AV equipments. 1394 IF part 5 is a controller AVC side input/output port, ROM 6 is the working memory of CPU 1 and ROM 7 stores fixing data of the program, etc. A display controller 8 outputs storing image element data of VRAM 3 to a selector 9. Then, 1394 IF part 10 generates the controller AVC side input/output port.

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LEGAL STATUS [Date of request for examination] 01.08.2001

[Date of sending the examiner's decision of rejection] 14.10.2003

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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## CLAIMS

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[Claim(s)]

[Claim 1] Said AV equipment which is AV system which connected two or more AV equipments to the television receiver which enabled the graphic display besides the image on the screen, and this television receiver through the digital interface, and is connected to said television receiver is a graphical display data distributed AV system characterized by transmitting original graphical display data to said television receiver according to the demand of said television receiver.

[Claim 2] Said digital interface is a graphical display data distributed AV system according to claim 1 characterized by giving equal communication link time amount periodically to each AV equipment possible and connected [ connects said two or more AV equipments to a daisy chain, and ] by the packet method

based on IEEE1394 specification.

[Claim 3] Said graphical display data are a graphical display data distributed AV system according to claim 1 which consists of an icon, graphical data, a mark, and an alphabetic character.

[Claim 4] The graphical display data distributed AV system according to claim 1 characterized by having the function to ask the digital interface prepared in said television receiver data required for the display of said AV equipment connected, and the function which controls the display screen based on the graphical display data from said AV equipment.

[Claim 5] The graphical display distributed AV system according to claim 1 characterized by having the record medium which stores graphical display data in said AV equipment, and the function which chooses suitable graphical display data to an inquiry of the graphical display data from the digital interface of said television receiver.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to AV system constituted by making mutually daisy chain connection of two or more AV equipments containing the television receiver which has the GUI (Graphic User Interface) function on which the information in the icon displayed on the display screen, a graphic, an alphabetic character, etc. itself or this information is displayed with a digital

interface, in order to give actuation of graphical display data, i.e., a user.

[0002]

[Description of the Prior Art] Conventionally, two or more sets of video tape recorders are connected to the television receiver by one set of GUI in which graphical display is possible at a radial, remote control is operated, the information about each video tape recorder is displayed by an icon etc. on the display screen of a television receiver, and AV system which enabled it to operate each video tape recorder intensively by the television receiver side exists by carrying out selection actuation of this icon etc.

[0003] In such an AV system, when it is going to operate a certain video tape recorder, two selection actuation, the actuation which chooses the video tape recorder for actuation from two or more video tape recorders, and the actuation which chooses the functions (rewind [ sound recording, playback, a halt ]) which the selected video tape recorder is made to perform, is required.

[0004] Conventionally [ above-mentioned ], AV system completed two above-mentioned selection actuation by the continuation 2 touch with cursor on the screen of a television receiver, therefore the television receiver has memorized the graphical display data about each AV equipment in memory in a

table format.

[0005] If the actuation demand to a predetermined video tape recorder is received from the remote control which a user operates, a television receiver will open a control window in the location matched with this video tape recorder on a screen by 1 to 1, and will display two or more feature buttons which show various functions in this control window. A user makes a video tape recorder perform the function by directing with cursor the feature button currently displayed.

[0006] In this case, a duplication indication of the control window is given with the image usual in the way of the following common knowledge.

(1) The design data and font data of a control window corresponding to each video tape recorder are beforehand stored in ROM of the control section (it consists of usual microcomputers) of a television receiver.

[0007] (2) A control section will transmit first the design data of the control window stored in ROM to a Video RAM, if directions of remote control are received. Then, a Video RAM stores the above-mentioned design data in the storage region equivalent to the viewing area to which it was assigned by the control window of this video tape recorder.

[0008] (3) Next, the font data stored in ROM is transmitted to a Video RAM. This font data is inserted in the data location equivalent to each feature button of a control window. Thus, the image data showing the control window formed on the Video RAM of one frame are formed. At this time, it is blank except the inner control window of the memory area of a Video RAM.

[0009] (4) Next, in the video-signal merge section, it is mixed with the usual video signal of a tuner, and the image finally displayed on CRT completes the image data showing the above-mentioned control window.

(5) Only the number of control windows performs the above-mentioned process to display two or more control windows.

[0010] Now, if the above-mentioned AV system is connected to a television receiver, four set [ of video tape recorders VTR ] (A) - (D) is connected to a radial and the actuation in the case of being constituted is explained, when making playback actuation perform to a video tape recorder VTR (A) for example, it will be operated as follows using GUI.

[0011] (1) The control section of a television receiver confirms whether to be the no to which the video tape recorder is connected about each control cable connected with two or more video tape recorders, investigates a model about the



video tape recorder connected, and registers this into the model table on RAM.

That will be registered into a model table if the video tape recorder is not connected to the control cable. Window design data is unified for every model, and the window design data corresponding to each video tape recorder will be decided by the above-mentioned model registration.

[0012] (2) If remote control is used and a menu display is specified next, cursor will be displayed while four icons corresponding to video tape recorder VTR (A) - (D) are displayed on four on a CRT screen. In addition, the icon has transparency so that the usual image may not be barred.

[0013] (3) the icon corresponding to a video tape recorder VTR (A) -- cursor -- specifying (click) -- the control window corresponding to a video tape recorder VTR (A) is displayed on the location of this icon. In addition, the class of feature button displayed in each control window, a number, and a layout can change with models of video tape recorder VTR, and the model of each video tape recorder can identify them now clearly by it.

[0014] (4) If for example, the "Play" carbon button in the control window of a video tape recorder VTR (A) is pushed, the command which starts playback actuation from a television receiver to a video tape recorder VTR (A) will be sent,

and the command it is directed that switches the video input of a television receiver to an output from a video tape recorder VTR (A) at coincidence will be published there. Consequently, while playback actuation of a video tape recorder VTR (A) is started, the output of a video tape recorder VTR (A) will input into a television receiver, and the playback image of a video tape recorder VTR (A) will be displayed on the screen of CRT.

[0015]

[Problem(s) to be Solved by the Invention] However, in the conventional AV system, since all graphical display data were intensively stored in the television television inside of a plane and it was matched with the input terminal and the fixed target, there were the following troubles.

[0016] (1) Other than the AV equipment registered beforehand, since it cannot display, it cannot respond to the display of a new AV equipment.

(2) The AV equipment and display which are actually connected may differ from each other.

(3) When failure occurs in an AV equipment, it cannot display other than the error message which the television receiver has memorized.

[0017] Therefore, in order that this invention may cancel the above-mentioned

trouble, each AV equipment carries out distributed maintenance of the graphical display data, graphical display data are transmitted by the demand from a television receiver, and a television receiver has a technical problem to the graphical data distributed AV system which was made to carry out graphical display only of the response to a demand.

[0018]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, with carrying out distributed possession of the graphical display data with each AV equipment, it is not fixed, and moreover the connection type of each AV equipment and a television receiver is switched, its connection is unnecessary, and two-way communication is possible for it, and it needs to assign equal and periodic air time to the communication link with each AV equipment and a television receiver.

[0019] Therefore, the graphical data distributed AV system concerning this invention possesses the digital interface mutually connected so that each AV equipment may give equal communication link time amount periodically to each AV equipment without other AV equipments and a connection switch for the television receiver in which graphical display is possible, two or more AV

equipments which store original graphical display data themselves and transmit graphical display data according to the demand of a television receiver, and the AV equipment connected possible [ two-way communication ] by the packet method.

[0020] Moreover, it is the graphical-display distributed AV system which has the function ask data required for the display of the AV equipment connected to the digital interface prepared in the television receiver, and the function which controls the display screen based on the graphical-display data from an AV equipment, and has the record medium which stores graphical-display data in an AV equipment, and the function which chooses suitable graphical-display data to an inquiry of the graphical-display data from the digital interface of a television receiver.

[0021] moreover, said digital interface -- IEEE1394 specification etc. -- like -- all AV equipments -- insertion and detachment -- it consists of serial buses connectable by free DIJ chain connection.

[0022] The graphical data distributed AV system by the above-mentioned configuration Do not keep graphical display data intensively to a television receiver, but it is kept with each AV equipment. Since it was made to output

according to the display demand from a television receiver Can display a graphic original with each AV equipment, and the graphic of only the AV equipment certainly connected to the television receiver is displayed. Graphical display can be performed also about the AV equipment of a new model, and the operating instruction of an AV equipment, a self-test, the error message at the time of abnormalities, etc. can be performed further.

[0023]

[Embodiment of the Invention] As shown in drawing 1 , the gestalt of desirable operation of the graphical data distributed AV system concerning this invention connects the AV equipment of variety a large number with the digital interface (it is indicated as 1394IF below) of IEEE1394 specification, and is constituted by the television receiver (Controller AVC and television receiver TV) with a graphical display function.

[0024] 1394IF is explained here. 1394IF is the so-called serial buses which can connect two or more AV equipments to a television receiver free [ insertion and detachment ] by DIJI chain connection, it switches to every AV equipment, there is no connection circuit, and each AV equipment can be performed by the communication link time amount which can assign the two-way communication

of a packet method equally and periodically among the other AV equipments of arbitration.

[0025] A television receiver and each AV equipment form the node of 1394IF.

Connection of each AV equipment is arbitration unless a loop formation is formed, and it can also take out two or more branches from one node.

[0026] In drawing 1 , infrared equipment IRU is connected with the digital videocassette recorder VCR, a digital video disc DVD and game machine G, Facsimile FAX and the music disk-swapping machine MDC, a digital audio tape recorder DAT and the compact disk exchange CDC, and Printer P at series.

[ television receiver TV, ] [ Controller AVC, ] [ Telephone TEL, ]

[0027] Even if the location or connection sequence of an AV equipment is not fixed and it replaces the location, it is changeless in any way on actuation only by ID of each AV equipment being updated. For example, although it connects in drawing 1 in order of the television receiver TV-> controller AVC-> digital videocassette recorder VCR, even if it changes this in order of the controller AVC-> television receiver TV-> digital videocassette recorder VCR, and it changes in order of digital videocassette recorder VCR-> controller AVC-> television receiver TV, there is no change in any way.

[0028] You may consider that Controller AVC and television receiver TV are one AV equipment in which graphical display is possible.

[0029] 1394IF consists of the same connector connected with 6 heart cable to the both ends of a cable, the LSI-ized physical layer which was connected to each connector, an LSI-ized link layer which was connected with the physical layer, and a transaction layer connected with the link layer. A transaction layer consists of firmware.

[0030] A cable consists of three pairs of shielding wire. Two of pairs [ them ] are with the data line and a strobe line, it is used for data transfer, and other one pair is used as a power-source line. Therefore, since the device on which the power source has fallen can also make a signal bypass, it can send a signal to a previous device from the device on which the power source has fallen.

[0031] The transceiver is built in the connector and the repeater is formed by this transceiver and cable. The end of the physical layer is connected with the above-mentioned cable, and the other end is connected with the link layer. The physical layer decrypts the code data received from the link layer to an electrical signal, and sends them out to a cable while it encodes the electrical signal inputted from the cable and sends it to a link layer. The physical layer performs

the below-mentioned bus arbitration etc. again.

[0032] A link layer decodes the packet received from the transaction layer while creating a packet based on the data encoded by the physical layer and transmitting to a transaction layer. Moreover, a link layer controls the transfer cycle of a packet.

[0033] 1394IF constituted as mentioned above has the following description.

(1) Since the connection between AV equipments is serial, all AV equipments can communicate with other AV equipments by the switch no connection.

(2) The AV equipment in AV system is not fixed, but can be freely added or deleted in the location of the arbitration in AV system by carrying out the insert and remove of the connector. At this time, it resets ID of each AV equipment automatically.

[0034] (3) It has a bus arbitration (mediation) function for a specific AV equipment not to monopolize a serial bus. This transmits data per packet and the packet size is restricted to a maximum of 512 bytes (in the case of a 100M bit per second transfer rate, it is equivalent to about 40 microseconds). As for each AV equipment, only each allocation time amount performs packet transmission in order of the node number specified.



[0035] (4) A packet is an always fixed time interval, and it has come to be unable to perform a transfer of other packets until it is sent out from a link layer and the transfer is completed. Each AV equipment will judge whether it is data required for itself, if a packet is received, and it processes or disregards it based on the decision result.

[0036] (5) There are an ordinary packet, an urgent packet with a high priority, and the below-mentioned isochronous packet with a still higher priority in a packet.

(6) A cable is thin, and since the connector is small, leading about of a cable and attachment and detachment of a connector are easy for it. Moreover, cost is cheap.

[0037] (7) The transfer rate of a signal is quick as compared with the conventional serial transmission. This is because a signal is read with DS link method which follows delivery and the regulation of "reading the data of the data line when one of the potentials of the data line or a strobe line change" by serial transmission (transfer per bit) using one pair of data lines, and one pair of strobe lines. This DS link method corresponds to the time shake of the potential of the data line. It becomes unnecessary to insert the conventional start bit and

conventional stop bit like serial transmission (for example, RS232C) at intervals of 8 bits by this, and a transfer rate improves.

[0038] Hereafter, about graphical display control, the relation between Controller AVC, television receiver TV, and the digital videocassette recorder VCR is mentioned as an example, and is explained.

[0039] 1. Configuration Controller AVC of Controller AVC VRAM3, EEPROM4, 1394IF sections 5, and RAM6 and ROM7 that were connected to the data bus 2 of CPU1 and CPU1, and the data bus 2, respectively as shown in drawing 2 , It consists of 1394IF sections 10 which intervene between the selector 9 which considers the display controller 8 connected with VRAM3, and a display controller's 8 output and the output of 1394IF sections 5 as an input, and a selector 9 and television receiver TV.

[0040] CPU1 controls the graphical display of the whole AV system by performing the graphical display program which makes GUI drive. A data bus 2 forms the path of the data outputted and inputted to CPU1. VRAM3 is memory which memorizes the graphic image for one screen. EEPROM4 stores the icon data sent from each AV equipment.

[0041] 1394IF sections 5 form the controller AVC side input/output port of 1394IF

which connects the digital videocassette recorder VCR with Controller AVC.

RAM6 is working-level month memory in case CPU1 performs a program. ROM7 stores fixed data, such as a program, a font, a fundamental graphic, and an icon.

[0042] A display controller 8 outputs the pixel data stored in VRAM3 to read-out and a selector 9 one by one. Whether the video signal inputted through 1394IF sections 5 from the digital videocassette recorder VCR and the video signal outputted by the display controller 8 are superimposed crawls on a selector 9 again, and it is outputted by a gap or independent.

[0043] 1394IF sections 10 form the controller AVC side input/output port of 1394IF which connects Controller AVC and television receiver TV.

[0044] 2. The configuration digital videocassette recorder VCR of the digital videocassette recorder VCR consists of a data bus 12 connected to CPU11 and CPU11, and 1394IF sections 13 connected to the data bus 12, respectively, RAM14 and ROM15 and the video audio signal playback block 16, as shown in drawing 3 .

[0045] By performing the program memorized by ROM15, CPU11 answers a control signal from the controller AVC inputted through 1394IF, and controls of operation [ at large / for transmitting the graphical display data stored in ROM15

to Controller AVC through 1394IF ].

[0046] The data bus 12 forms the path of data in case CPU11 performs a program. 1394IF sections 13 form the digital videocassette recorder VCR side I/O Port of 1394IF which connects the digital videocassette recorder VCR with Controller AVC.

[0047] RAM14 is the activity memory for program executions of CPU11. ROM15 is read-only memory which stores fixed data, such as a program, an icon of a digital videocassette recorder VCR proper, and an error message.

[0048] The video audio signal playback block 16 shows collectively all the circuits for reproducing the video signal and sound signal which are recorded on record media, such as a video tape. The video audio signal playback block 16 performs playback actuation under control of CPU11, and the read image/sound signal are outputted to 1394IF sections 13.

[0049] 1394IF sections 13 have the function which sends out the playback output signal from the video audio signal playback block 16 to Controller AVC while sending the control signal from Controller AVC into CPU11 through a data bus 12.

[0050] 3. In AV system shown in the graphical display control chart 1 , if an AV

equipment is newly connected to the serial bus of 1394IF, Controller AVC will detect it and will update ID of all the AV equipments in AV system.

[0051] A flow chart shows the graphical display control action which CPU1 of the controller AVC at this time performs to drawing 4 . In drawing 4 , if it detects that the digital videocassette recorder VCR was newly connected at a step ST 1, CPU1 progresses to a step ST 2, asks graphical display data (icon data) through 1394IF sections 5 and 1394IF to the newly connected digital videocassette recorder VCR, and it will stand by until there is a response.

[0052] On the other hand, at a step ST 3, CPU11 of the digital videocassette recorder VCR will transmit the icon data stored in ROM15 to Controller AVC through read-out, 1394IF sections 13, and 1394IF, if the above-mentioned inquiry is received through 1394IF sections 13.

[0053] If it judges that the requirements for CPU1 of Controller AVC receiving the above-mentioned icon data through 1394IF sections 5 in a step ST 4, and displaying a control screen are ready By arranging icon data, such as a picture in which the appearance of the digital videocassette recorder VCR which progressed to a step ST 5 and was received is shown, and a notation which shows a model, on VRAM3, the image of a control screen is created and it sends

to a selector 9 through a display controller 8.

[0054] A selector 9 superimposes the image of this control screen, and the usual image, and sends them to television receiver TV through 1394IF sections 10. Then, for example, as shown in drawing 5 , into the usual image, the notation which shows the model of connected AV equipment, the graphic which shows an appearance, the alphabetic character which shows form superimpose, and it is displayed by the screen of television receiver TV.

[0055] Drawing 6 shows the example of a display of the icon showing two or more feature buttons for digital videocassette recorder VCR actuation. By choosing one of two or more of these feature buttons with cursor 17 using pointing remote control, actuation corresponding to the feature button is performed.

[0056] In addition, although the infrared light-receiving equipment which naturally receives the infrared signal from the remote control which is not illustrated and remote control, and is transmitted to Controller AVC is contained in AV system, these may be constituted as some controllers AVC, and they may be constituted so that you may connect with a serial bus as independent equipment or it may communicate with Controller AVC through 1394IF as some

television receiver TV.

[0057]

[Effect of the Invention] As explained above, the graphical data distributed AV system concerning this invention makes graphical display data original with each AV equipment keep it, and since it was made to send to the AV equipment which has a graphical display function at the time of the need, it does the following effectiveness so.

[0058] (1) Since direct graphical display data are got from the AV equipment actually connected and it is displayed in AV system, it does not happen that the AV equipments actually connected with the display differ.

(2) Since it has graphical display data for every AV equipment, it is effective in the AV equipment of the same category also being able to carry out peculiar graphical display for every model, identifying it, and being called \*\*\*\*\*.

[0059] (3) Since the new AV equipment made after the stage which connected the controller to AV system since it was freely connectable with the location of the arbitration of a new AV equipment or a serial bus can also perform graphical display, it is convenient to operate it.

(4) Graphical display becomes possible about the error message at the time of

the abnormalities of an AV equipment at a detail, and there is effectiveness referred to as being able to raise functionality.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]



[Drawing 1] It is the block diagram showing the gestalt of operation of the graphical data distributed AV system concerning this invention.

[Drawing 2] It is the block diagram showing the configuration of the controller AVC in drawing 1 .

[Drawing 3] It is the block diagram showing the configuration of the digital videocassette recorder VCR in drawing 1 .

[Drawing 4] It is the flow chart showing graphical display management of Controller AVC.

[Drawing 5] It is the explanatory view showing an example of a graphical display screen.

[Drawing 6] It is the explanatory view showing an example of a graphical display screen.

#### [Description of Notations]

1 CPU

2 Data Bus

3 VRAM

4 EEPROM

5 1394IF Sections

6 RAM

7 ROM

8 Display Controller

9 Selector

10 1394IF Sections

11 CPU

12 Data Bus

13 1394IF Sections

14 RAM

15 ROM

16 Video Audio Signal Playback Block

17 Cursor

1394IF IEEE1394 specification digital interface

TV Television receiver

VCR Digital videocassette recorder

DVD Digital video disc

G Game machine

TEL Telephone

FAX Facsimile

MDC Music disk-swapping machine

DAT Digital audio tape recorder

CDC Compact disk exchange

P Printer

IRU Infrared equipment

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開平9-149325

(43)公開日 平成9年(1997)6月6日

(51)Int.Cl. <sup>8</sup>	識別記号	序内整理番号	F I	技術表示箇所
H 0 4 N	5/44		H 0 4 N	5/44 A
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(21)出願番号 特願平7-302642

(22)出願日 平成7年(1995)11月21日

(71)出願人 000002185

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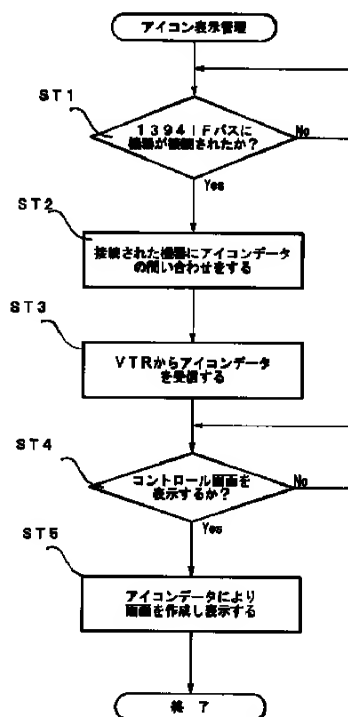
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(54)【発明の名称】 グラフィック表示データ分散型AVシステム

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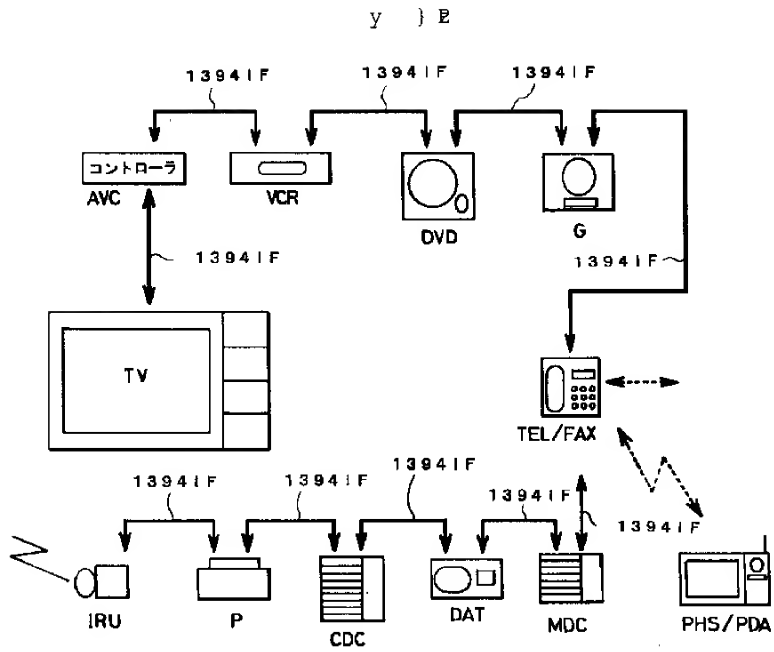




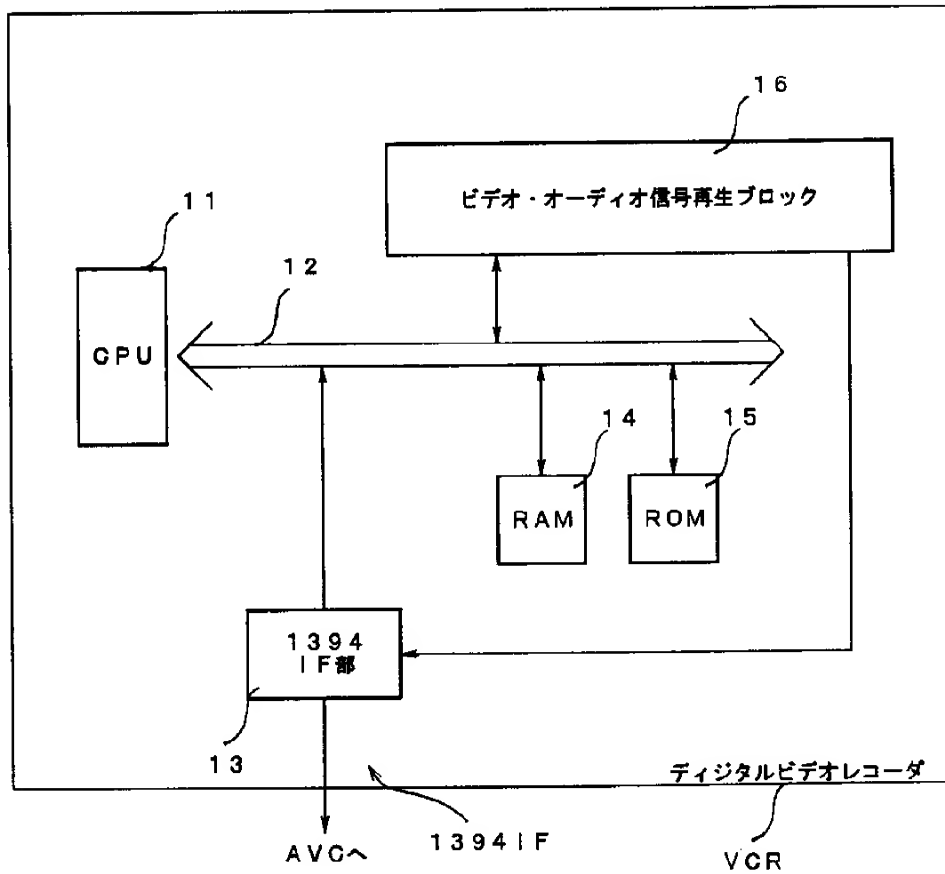
[ ~ Ø A C R f [ ^ 𐀀  
 R ~ P R X S h e ~ 𐀁  
 Ø B  
 y O O T R z R g [ 𐀂  
 r s S 𐀃 𐀄 ~ A a L A C 𐀅  
 T ~ M A R g 𐀆  
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 i A M % f B W ^ 𐀉  
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 ^ X Ø B  
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(7)

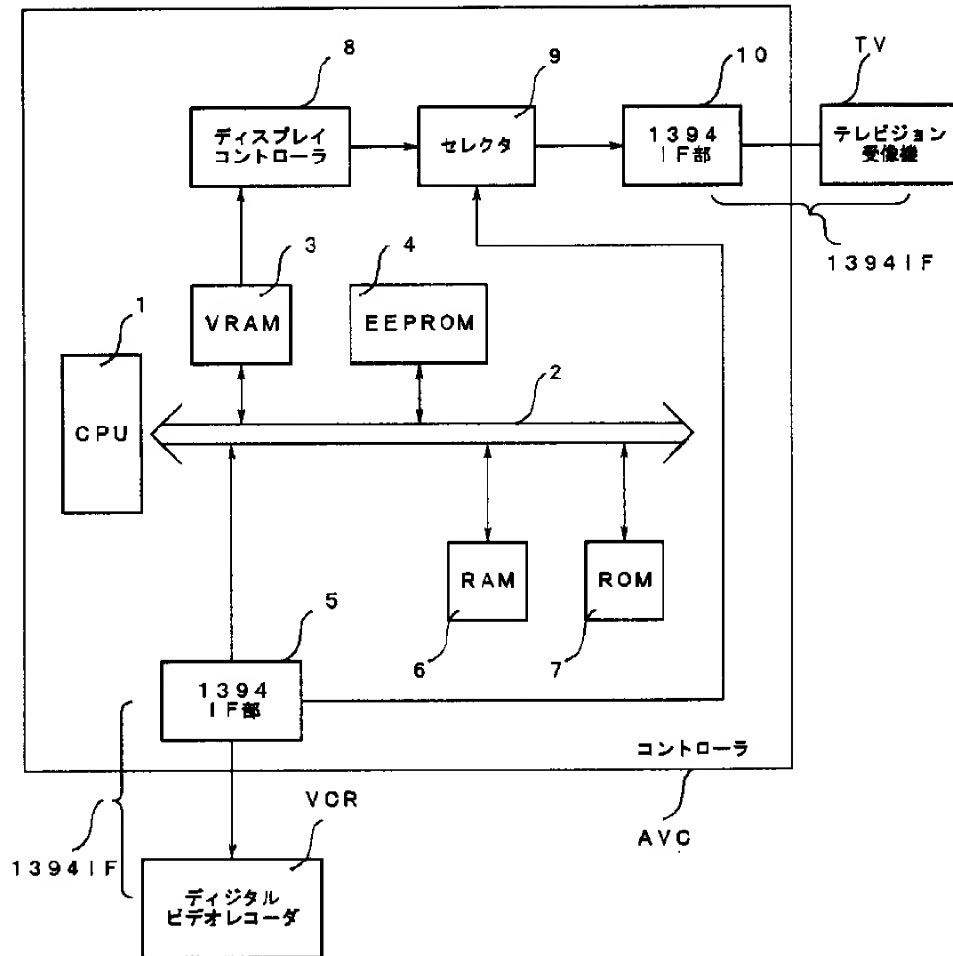
J 8 X |



y } E



y } 0



y } 2

y } 0

